

CLAIMS

1. A regenerative braking system for a vehicle, comprising:
a displacement on demand (DOD) engine including
cylinders;
a battery;
5 an electric machine that has motor and generator modes and
that is selectively driven by a wheel of said vehicle; and
a controller that detects a braking condition of said vehicle,
that deactivates at least one of said cylinders in response to said
braking condition, and that operates said electric machine in said
10 generator mode during said braking condition to charge said battery.
2. The regenerative braking system of claim 1 wherein said
controller deactivates all of said cylinders of said engine in response to
said braking condition.
3. The regenerative braking system of claim 1 wherein said
controller detects termination of said braking condition and activates
said at least one of said cylinders in response to said termination.
4. The regenerative braking system of claim 1 wherein said
controller monitors a vehicle speed and activates said at least one of
said cylinders when said vehicle speed achieves a threshold.
5. The regenerative braking system of claim 1 wherein said
controller selectively operates said electric machine in said motor mode
to drive said wheel.
6. The regenerative braking system of claim 1 wherein said
controller selectively deactivates all of said cylinders of said engine and
operates said electric machine in said motor mode to drive said wheel.

7. The regenerative braking system of claim 6 wherein said electric machine charges said battery when operating in said generator mode.

8. A method of charging and discharging a battery in a vehicle, comprising:

- detecting a braking condition of said vehicle;
- 5 deactivating at least one cylinder of an engine in response to said braking condition; and
- driving an electric machine in a generator mode with a wheel of said vehicle to charge said battery.

9. The method of claim 8 further comprising:
deactivating all of said cylinders of said engine; and
activating said electric machine in a drive mode to drive said wheel.

10. The method of claim 9 further comprising providing electrical current to said electrical machine from said battery.

11. The method of claim 8 further comprising deactivating all cylinders of said engine in response to said braking condition.

12. The method of claim 8 further comprising:
detecting termination of said braking condition; and
activating said cylinder in response to said termination.

13. A method of operating a vehicle having a regenerative braking system, comprising:
- detecting a braking condition of said vehicle;
 - deactivating a cylinder of an engine in response to said
- 5 braking condition;
- retarding motion of said vehicle by driving an electric machine in a generator mode with a wheel of said vehicle to generate electrical current;
 - detecting termination of said brake condition; and
- 10 activating said cylinder and relieving said retarding in response to said termination.

14. The method of claim 13 further comprising charging a battery with said electrical current.

15. The method of claim 13 further comprising:

- deactivating all cylinders of said engine; and
- activating said electric machine in a drive mode to drive said wheel.

16. The method of claim 15 further comprising providing electrical current to said generator from a battery.